



## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification <sup>5</sup> :  A63C 17/06	A1	(11) International Publication Number: WO 93/12846 (43) International Publication Date: 8 July 1993 (08.07.93)
---	----	---

(21) International Application Number: PCT/EP92/02892

(22) International Filing Date: 14 December 1992 (14.12.92)

(30) Priority data:  
TV91A000127 20 December 1991 (20.12.91) IT

(71) Applicant (for all designated States except US): NORDICA S.P.A. [IT/IT]; Via Piave, 33, I-31044 Montebelluna (IT).

(72) Inventor; and

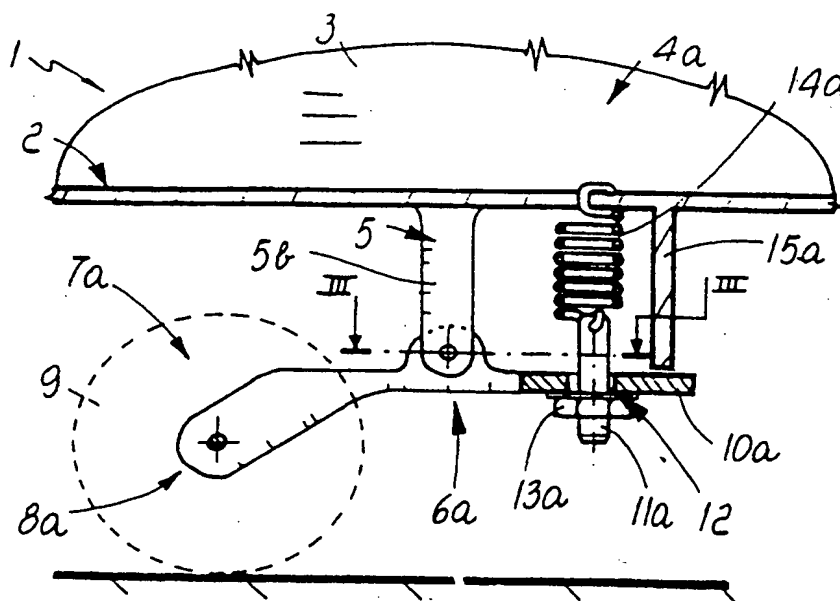
(75) Inventor/Applicant (for US only): POZZOBON, Alessandro [IT/IT]; Via Ruga, 15, I-31050 Paderno di Ponzano Veneto (IT).

(74) Agent: MODIANO, Guido; Modiano, Josif, Pisanty &amp; Staub, Via Meravigli, 16, I-20123 Milan (IT).

(81) Designated States: AU, CA, JP, US, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).

Published  
With international search report.

(54) Title: SKATE WITH ALIGNED WHEELS



(57) Abstract

A skate with aligned wheels which includes a support (2) for an item of footwear (3) from which a frame (5) protrudes downward; the first ends (6a) of two wheel supporting trucks (7a) are independently pivoted to the frame, and the skate includes an element (11a), which protrudes below the support, for connecting the frame and first ends of the two pairs of wheel supporting trucks. The peculiarity of the invention consists of the fact that adjusting members (13a, 14a) for adjusting and/or limiting the oscillation of the two pairs of trucks with respect to the support are associated with the connecting element.

**FOR THE PURPOSES OF INFORMATION ONLY**

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AT	Austria	FR	France	MR	Mauritania
AU	Australia	GA	Gabon	MW	Malawi
BB	Barbados	GB	United Kingdom	NL	Netherlands
BE	Belgium	GN	Guinea	NO	Norway
BF	Burkina Faso	GR	Greece	NZ	New Zealand
BG	Bulgaria	HU	Hungary	PL	Poland
BJ	Benin	IE	Ireland	PT	Portugal
BR	Brazil	IT	Italy	RO	Romania
CA	Canada	JP	Japan	RU	Russian Federation
CF	Central African Republic	KP	Democratic People's Republic of Korea	SU	Sudan
CC	Congo	KR	Republic of Korea	SE	Sweden
CH	Switzerland	KZ	Kazakhstan	SK	Slovak Republic
CI	Côte d'Ivoire	LI	Liechtenstein	SN	Senegal
CM	Cameroon	LK	Sri Lanka	SU	Soviet Union
CS	Czechoslovakia	LU	Luxembourg	TD	Chad
CZ	Czech Republic	MC	Monaco	TG	Togo
DE	Germany	MG	Madagascar	UA	Ukraine
DK	Denmark	ML	Mali	US	United States of America
ES	Spain	MN	Mongolia	VN	Viet Nam
FI	Finland				

## SKATE WITH ALIGNED WHEELS

Technical field

The present invention relates to a skate with aligned wheels.

Background Art

A first type of conventional skate with aligned wheels has a support for an item of footwear from which a pair of longitudinal wings protrudes; a plurality of aligned wheels is freely pivoted transversely between the wings.

This first conventional skate has a few inconveniences: the wheels are rigidly pivoted to the pair of wings and this causes a direct transmission to the item of footwear of all the stresses due to ground unevennesses encountered during sports practice, with the consequent discomfort for the user.

The structural rigidity of this known solution also causes the transmission of vibrations to the item of footwear and thus to the legs of the user, hindering his sports performance.

A sports implement is also known, which is predominantly used by skiers for summer training on roads, and is composed of a support for an item of footwear from which a frame protrudes centrally downward; the ends of two pairs of wheel supporting trucks are independently pivoted to the frame, and the head of a screw with a threaded stem is connected to the support in the interspace between two adjacent wheels. A complementarily threaded nut is associated with the stem and abuts on the ground-facing surface of a connecting element which is arranged transversely to each pair of trucks; a cylindrical helical

compression spring is arranged coaxially to the stem.

This known solution, illustrated in the Italian patent no. 2182185, allows, by adjusting the compaction of the spring, to vary the angle formed between each pair of wheel  
5 supporting trucks and the ground.

In this solution, adjustment of the degree of compaction of the spring allows only to vary the conditions of use of the implement in the sports practice of slalom; in fact, when the setting of the spring is at minimum, i.e.  
10 when the spring is not compressed, it is possible to achieve easy use for the practice of slalom, but one also observes yielding in the pushing action when traveling in straight paths, with a considerable deterioration of the athletic performance.

15 When adjustment of the spring leads to a gradual compression thereof, the outermost wheels of the pairs of trucks rise and thus separate from the ground by a more or less large extent; this condition can allow to improve the use of the implement in the practice of slalom, but this  
20 again entails a non-optimum and thus unstable condition during straight paths and therefore in the practice of speed skating, and all the vibrations due to impacts against bumps which protrude from the ground or due to uneven parts thereof are in any case transmitted to the item of footwear  
25 and therefore to the legs of the user.

#### Disclosure of the Invention

One aim of the present invention is to eliminate the problems described above in conventional skates by providing a skate which allows to protect the legs of the user against the stresses which can be transmitted thereto as a

consequence of travel over rough or uneven ground.

Within the scope of the above aim, an object of the invention is to provide a skate which allows to protect the legs of the user against the stresses which can be transmitted thereto as a consequence of travel over uneven or rough ground without forcing the user to intervene directly in order to achieve these characteristics but allowing said user at the same time to adapt them to his own specific requirements, such as his weight and level of skill in the sport, or to the type of ground surface.

A further object is to provide a skate which is simple, easy to industrialize, reliable and safe in use and has low manufacturing costs.

This aim, these objects and others which will become apparent to those skilled in the art, are achieved by a skate with aligned wheels, comprising a support for an item of footwear from which a frame protrudes downward, first ends of at least two pairs of wheel supporting trucks being independently pivoted to said frame, and comprising a connecting element, said connecting element protruding below said support, said connecting element being adapted to connect said first ends of said at least two wheel supporting trucks, characterized in that means for adjusting the oscillation of said at least two trucks with respect to said support are associated with said connecting element.

#### Brief description of the drawings

Further characteristics and advantages of the invention will become apparent from the detailed description of some particular but not exclusive embodiments of a skate according to the invention, illustrated only by way of non-

limitative example in the accompanying drawings, wherein:

figure 1 is a partially sectional side view of the tip region of the skate;

figure 2 is a partially sectional side view of the entire skate;

figure 3 is a sectional view, taken along the plane III-III of figure 1;

figure 4 is a view, similar to the one of figure 1, of a means for adjusting the abutment of the first ends of the two wheel supporting trucks;

figure 5 is a view, similar to the one of figure 1, of a skate having four aligned wheels;

figure 6 is a view, similar to the one of figure 1, of a skate having five aligned wheels;

figure 7 is a view, similar to the one of figure 1, of a solution which comprises a stroke limiter for the first ends of the two wheel supporting trucks;

figure 8 is a sectional view of the skate of the preceding figure, taken along the plane VIII-VIII of figure 7;

figure 9 is a partially sectional side view of a further embodiment of the skate according to the invention;

figure 10 is a bottom view of the skate of the preceding figure;

figure 11 is a view, similar to the one of figure 1, of still a further embodiment of the skate.

#### Ways of carrying out the Invention

With reference to the above figures, a skate, generally designated by the reference numeral 1, comprises a support 2 for an item of footwear 3, from which a frame 5 protrudes

downward proximate to the regions 4a and 4b which are adjacent to a median region.

The frame is constituted by a pair of wings 5a and 5b which protrude so that they are mutually parallel and may extend for the full length of the support 2, as shown in figures 1 and 2. The first ends 6a and 6b of two trucks, which are substantially U-shaped and are designated by the reference numerals 7a and 7b, are independently pivoted to the frame at the terminal ends. A plurality of wheels 9 is pivoted between the second ends 8a and 8b of the trucks; the wheels being thus mutually aligned.

A base, designated by the numerals 10a and 10b, protrudes from the first ends of each one of the trucks in the direction opposite to said wheel.

The trucks are connected to the support by a connection element arranged below the support 2 at each one of the underlying bases 10a and 10b. The connecting element is constituted by a first threaded stem, designated by the numerals 11a and 11b, which passes through an adapted first hole 12 defined on each base.

Each one of the threaded stems is connected, at its ends, to a complementarily threaded nut, designated by the numerals 13a and 13b, and to one end of an elastically deformable element, such as a spring 14a and 14b, which is in turn associated with the overlying frame 2 at its other end.

An adjusting means is thus formed for adjusting the stroke of the bases 10a and 10b with respect to the support 2, and it is possible to act on the nuts 13a and 13b in order to vary the loading of the springs 14a and 14b, so as

to obtain a skate which is more or less rigid and is thus more or less affected by ground roughness.

A limit means for limiting the oscillation of the trucks is arranged below the support 2 and protrudes toward  
5 the underlying bases 10a and 10b. The limit means is constituted by one or more bars 15a and 15b which are slightly shorter than the distance between the support 2 and the bases, which are arranged on a plane which is approximately parallel to the rolling plane of the wheels.

10 An adjuster means may optionally be provided for adjusting the extension of the bars 15a and 15b. The adjuster means is constituted by a screw 16 which comprises a head 17 protruding toward the ground at a second hole 18  
15 formed in the bases. Screw 16 also has a second threaded stem 19 which interacts, at one end, with a complementarily threaded seat 20 which is defined axially with respect to each bar. A washer 21 is coupled to the seat and abuts at the surface of the respective base which faces the support  
2.

20 A rotation imparted to the head 17 of the screw 16 causes the washer 21 to move toward or away from the terminal end of the bar, thus allowing to vary the length thereof.

It has thus been observed that the invention has  
25 achieved the intended aim and objects, a skate with aligned wheels having been obtained wherein it is possible for the user to protect his legs from the stresses which can be transmitted thereto, as a consequence of travel over rough or uneven ground, by varying the rigidity of the skate  
30 according to his own requirements, such as weight, level of



skill in the sport, type of ground on which the sport is practiced.

The skate thus conceived is susceptible to numerous modifications and variations, all of which are within the  
5 scope of the inventive concept.

Thus, for example, figures 5 and 6 are views of a second embodiment of the skate according to the invention, generally designated by the reference numeral 101, which comprises a support 102 for an item of footwear 103 from  
10 which a frame protrudes downward. The frame is composed of a pair of wings 105 to which two trucks, designated by the reference numerals 107a and 107b, are independently pivoted. The trucks have a substantially U-shaped cross-section. A pair of wheels 109a, 109b and 109e, 109d are freely pivoted  
15 at the first ends 106a, 106b and at the second ends 108a and 108b respectively of the frame.

Adapted pins 122a and 122b for pivoting to the frame 105 are transversely associated in the interspace between the first and second ends of each one of the trucks.

20 A base, designated by the numerals 110a and 110b, is connected to the first ends of each one of the trucks along a plane which is inclined toward the ground and protrudes in the direction opposite to the one of the wheels pivoted to the respective truck.

25 A connecting element is arranged below the support 102 at each one of the underlying bases 110a and 110b, for connecting the trucks to the support. The connecting element comprises a threaded stem, designated by the numerals 111a and 111b, which passes through an adapted hole 112a and 112b  
30 defined in each base.

Each one of the threaded stems is connected, at its ends, to a complementarily threaded nut, designated by the reference numerals 113a and 113b, and to an end of an elastically deformable element, such as a spring 114a and 5 114b, which is in turn associated with the overlying frame 102 at its other end.

An adjuster means is thus formed for adjusting the stroke of the bases 110a and 110b and thus of the first ends 106a and 106b with respect to the support 102.

10 A limit means for limiting the oscillation of the trucks is arranged below the support 102 and protrudes toward the underlying bases 110a and 110b. The limit means is constituted by one or more bars 115a and 115b which are slightly shorter than the distance between the support 102 15 and the bases and are arranged on a plane which is approximately parallel to the rolling plane of the wheels.

As illustrated in figure 6, a further wheel 109e, also pivoted to the frame 105, can be interposed between the bases 110a and 110b.

20 In this embodiment, too, it is possible to provide an adjuster means for adjusting the extension of the bars 115a and 115b which are similar to those illustrated in figure 4.

Figures 7 and 8 illustrate a third embodiment of the invention wherein a skate, generally designated by the reference numeral 201, comprises a support 202 for an item 25 of footwear 203 from which a frame protrudes downward. The frame is composed of a pair of wings 205a and 205b which are mutually parallel and to which the first ends 206a and 206b of two trucks, designated by the reference numerals 207a and 30 207b, are independently pivoted at their terminal ends.

Wheels 209a and 209b are pivoted between the second ends 208a and 208b of the trucks and are thus mutually aligned.

A case structure which is open toward the support 202 is provided at the first ends of each one of said trucks; a base, designated by the reference numerals 210a and 210b, and first and second pairs of perimetric edges, designated by the reference numerals 223a, 223b, 224a and 224b, are defined in said case structure.

The trucks are connected to the support by a connecting element arranged below the support 202 at each one of the underlying bases 210a and 210b. The connecting element is constituted by a threaded stem, designated by the reference numerals 211a and 211b, which passes through an adapted hole defined in each base.

Each one of said threaded stems is connected, at its ends, to a complementarily threaded nut, designated by the reference numerals 213a and 213b, and to an end of an elastically deformable element, such as a spring 214a and 214b, which is in turn associated with the overlying frame 202 at its other end.

An adjuster means is thus formed for adjusting the stroke of the bases 210a and 210b and therefore of the first ends 206a and 206b with respect to the support 202.

A limit means for limiting the oscillation of the trucks is arranged below the support 202 and slightly protrudes toward the underlying first and second pairs of perimetric edges 223a, 223b, 224a and 224b. The limit means is constituted by first ridges 215a and 215b and by second ridges 215c and 215d.

Advantageously, ridges 215a and 215b, which are made of elastically deformable plastic material, are suitable to limit the maximum upward movement of the first wheels 209a and 209b, during sports activity, in order to avoid direct  
5 contact of the wheel during damping, which would lead to temporary locking of said wheels with the consequent risk of a fall for the skater.

As illustrated in figure 7, a third wheel 209a, also pivoted to the frame 205, can be interposed between the  
10 bases 210a and 210b.

Figures 9 and 10 illustrate a fourth embodiment of a skate, generally designated by the reference numeral 301, which comprises a support 302 for an item of footwear 303 from which a frame protrudes downward proximate to the  
15 median region. The frame is constituted by a pair of wings 305a and 305b to which two substantially U-shaped trucks, designated by the numerals 307a and 307b, are pivoted independently and approximately at the median regions.

Two pairs of wheels 309a, 309b, 309c and 309d are  
20 pivoted at the second ends 308a and 308b of the trucks and are thus mutually aligned.

Starting from the median regions of the trucks which are pivoted to the pair of wings 305a and 305b, the trucks are shaped so as to extend toward the adjacent truck, so as  
25 to define two pairs of arms 325a, 325b and 326a, 326b which cross one another, overlap and are connected to each other so as to define a first end, designated by the reference numerals 306a and 306b, which is arranged respectively at the regions of the support 302 which are located below the  
30 heel 327 and the tip 328.

Bases 310a and 310b are defined at the first ends 306a and 306b.

The trucks are connected to the support by means of a connecting element arranged below the support 302 at each  
5 one of the underlying bases 310a and 310b. The connecting element is constituted by a threaded stem, designated by the reference numerals 311a and 311b, which passes through an adapted hole 312a and 312b which is defined in each base.

Each one of the threaded stems is connected, at its  
10 ends, to a complementarily threaded nut, designated by the reference numerals 313a and 313b, and to an end of an elastically deformable element, such as a spring 314a and 314b, which is in turn associated with the overlying frame 302 at its other end.

15 An adjuster means is thus formed for adjusting the stroke of the bases 310a and 310b and thus of the first ends 306a and 306b with respect to the support 302.

Figure 11 is a view of a further embodiment of a skate, generally designated by the reference numeral 401, which  
20 comprises a support 402 for an item of footwear 403 from which a frame 405 protrudes downward. The first end 406 of a substantially U-shaped truck, designated by the reference numeral 407, is pivoted to the frame; a wheel 409 is pivoted between the second ends 408 of the truck.

25 A base 410 protrudes from the first end 406 of the truck 407 in the direction opposite to the wheel 409, and a first threaded hole 412 is defined therein.

The end of an elastically deformable element, such as a spring 414 associated with the base 410 at its other end, is  
30 associated below the support 402 at the underlying base 410.

A complementarily threaded stem 411 of a screw can be associated at the first threaded hole 412; the head 417 of said screw protrudes beyond said base 410 toward the ground, and its end presses against an abutment 429 which protrudes 5 below the support 402, thus acting as a means for limiting the oscillation of the truck 407.

For all the above described embodiments it is possible to provide a means for adjusting the extension of the means for limiting the oscillation of the trucks which are similar 10 to those illustrated in figure 4.

The materials and the dimensions of the individual elements which constitute the skate structure may be the most appropriate according to the specific requirements.

Where technical features mentioned in any claim are 15 followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly, such reference signs do not have any limiting effect on the scope of each element identified by way of example by such 20 reference signs.

CLAIMS

1           1. Skate with aligned wheels, comprising a support  
2 (2,102,202,302,402) for an item of footwear  
3 (3,103,203,303,403) from which a frame (5,105,205,305,405)  
4 protrudes downward, first ends (6a,6b) of at least two pairs  
5 of wheel supporting trucks (7a,7b) being independently  
6 pivoted to said frame, and comprising a connecting element  
7 (11a,11b), said connecting element protruding below said  
8 support, said connecting element being adapted to connect  
9 said first ends of said at least two wheel supporting  
10 trucks, characterized in that means (13a,13b,14a,14b) for  
11 adjusting the oscillation of said at least two trucks with  
12 respect to said support are associated with said connecting  
13 element.

1           2. Skate according to claim 1, characterized in that  
2 said first ends of said at least two trucks are  
3 substantially U-shaped, and are independently pivoted, at  
4 their terminal ends, to said frame, said frame being  
5 constituted by a pair of wings (5a,5b) said wings protruding  
6 so that they are mutually parallel, a plurality of mutually  
7 aligned wheels (9) being pivoted between second ends (8a,8b)  
8 of said trucks, a base (10a,10b) protruding, in the  
9 direction opposite to an adjacent wheel, from each of said  
10 first ends of each one of said trucks.

1           3. Skate according to claim 2, characterized in that a  
2 connecting element for connection between said trucks and  
3 said support is arranged below said support at each one of  
4 said underlying bases, said connecting element being  
5 constituted by a first threaded stem (11a,11b) which passes  
6 through an adapted first hole (12) defined in each one of

7 said bases.

1       4. Skate according to claim 3, characterized in that  
2 each one of said threaded stems is connected, at its ends,  
3 to a complementarily threaded nut (13a,13b) and to one end  
4 of an elastically deformable element (14a,14b) which is in  
5 turn associated, at its other end, with said overlying frame  
6 so as to constitute a means for adjusting the stroke of said  
7 bases with respect to said support.

1       5. Skate according to claim 4, characterized in that a  
2 limit means for limiting the oscillation of said trucks  
3 furthermore protrude below said support toward said  
4 underlying bases, said limit means being constituted by bars  
5 (15a,15b) which are slightly shorter than the distance  
6 between said support and said bases, said bases being  
7 arranged on a plane which is approximately parallel to the  
8 rolling plane of said wheels.

1       6. Skate according to claim 5, characterized in that an  
2 adjuster means is provided for adjusting the extension of  
3 said bars, said adjuster means being constituted by a screw  
4 (16) comprising a head (17), said head protruding toward the  
5 ground at a second hole (18) defined on said bases, said  
6 screw comprising a second threaded stem (19) which  
7 interacts, at one end, with a complementarily threaded seat  
8 (20) defined axially with respect to each one of said bars  
9 and to which a washer (21) is coupled, said washer abutting  
10 at the surface of the respective base which faces said  
11 support.

1       7. Skate according to claim 1, characterized in that  
2 said two trucks (107a,107b) have a substantially U-shaped  
3 transverse cross-section, each truck being provided with a



4 pair of wheels (109a,109b,109e,109d) which are freely  
5 pivoted respectively at said first end (106a,106b) and at  
6 said second end (108a,108b), adapted pins (122a,122b) for  
7 pivoting to said frame (105) being transversely associated  
8 in the interspace between said first and second ends of each  
9 one of said trucks.

1 8. Skate according to claim 7, characterized in that a  
2 base (110a,110b) is connected to said first ends of each one  
3 of said trucks along a plane which is inclined toward the  
4 ground, said base protruding in the direction opposite to  
5 the one of said wheels which are pivoted to the respective  
6 truck.

1 9. Skate according to claim 8, characterized in that a  
2 connecting element for connecting said trucks and said  
3 support is arranged below said support at each one of said  
4 underlying bases, said connecting element being constituted  
5 by a threaded stem (111a,111b) which passes through an  
6 adapted hole (112a,112b) defined in each one of said bases,  
7 each one of said threaded stems being connected, at its  
8 ends, to a complementarily threaded nut (113a,113b) and to  
9 one end of an elastically deformable element (114a,114b)  
10 which is in turn associated, at its other end, with said  
11 overlying frame, said threaded stems, said nuts and said  
12 spring constituting a means for adjusting the stroke of said  
13 bases with respect to said support.

1 10. Skate according to claim 9, characterized in that a  
2 limit means for limiting the oscillation of said trucks  
3 protrudes below said support toward said underlying bases,  
4 said limit means being constituted by bars (115a,115b) which  
5 are slightly shorter than the distance between said support

6 and said bases, which are arranged on a plane which is  
7 approximately parallel to the rolling plane of said wheels.

1 11. Skate according to claim 1, characterized in that a  
2 case structure, open toward said support (202), is formed at  
3 said first ends (206a,206b) of each one of said trucks  
4 (207a,207b), a base (210a,210b) and first (223a,223b) and  
5 second (224a,224b) pairs of perimetric edges being formed in  
6 said case structure.

1 12. Skate according to claim 10, characterized in that  
2 a connecting element for connecting said trucks and said  
3 support is arranged at each one of said underlying bases  
4 below said support, said connecting element being  
5 constituted by a threaded stem (211a,211b) which passes  
6 through an adapted hole formed on each one of said bases,  
7 each one of said threaded stems being connected, at its  
8 ends, to a complementarily threaded nut (213a,213b) and to  
9 an end of an elastically deformable element (214a,214b),  
10 which is in turn associated with said overlying frame at its  
11 other end.

1 13. Skate according to claim 12, characterized in that  
2 a limit means for limiting the oscillation of said trucks  
3 protrude slightly below said support toward said underlying  
4 first and second pairs of perimetric edges, said limit means  
5 being constituted by first ridges (215a,215b) and by second  
6 ridges (215c,215d).

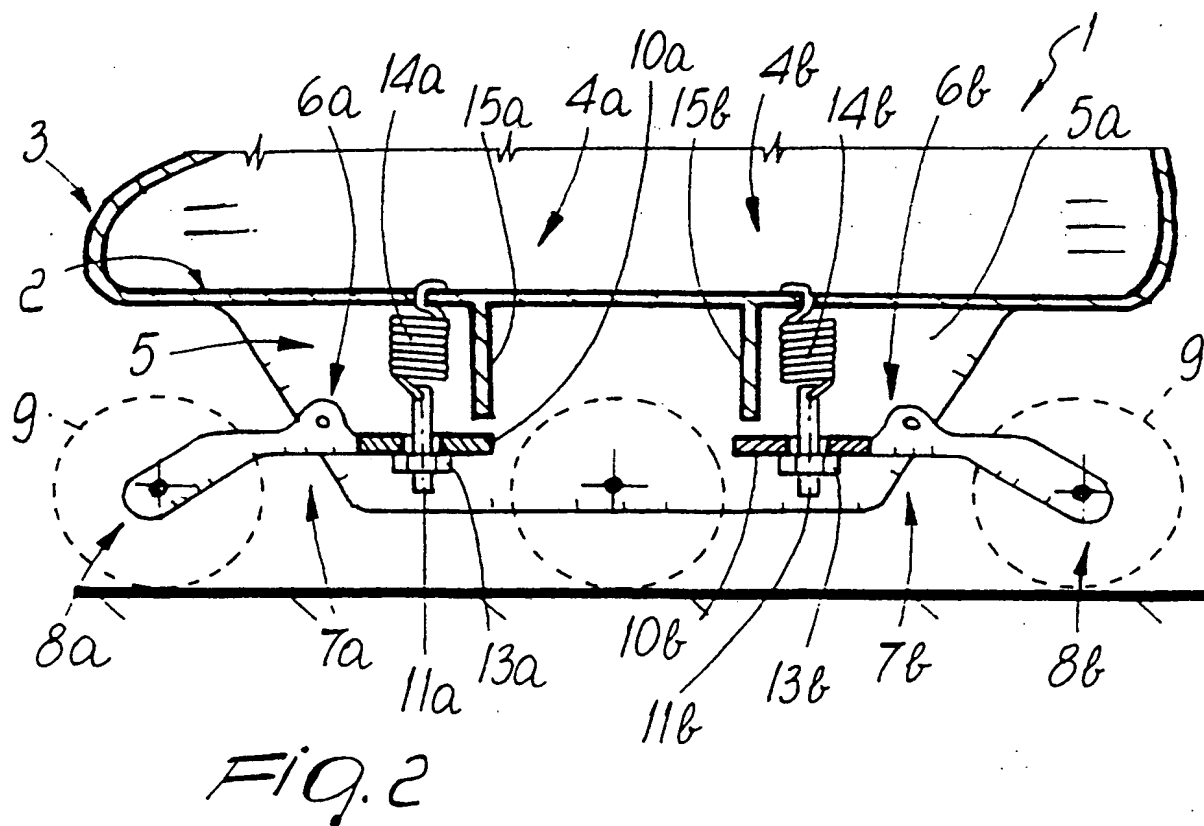
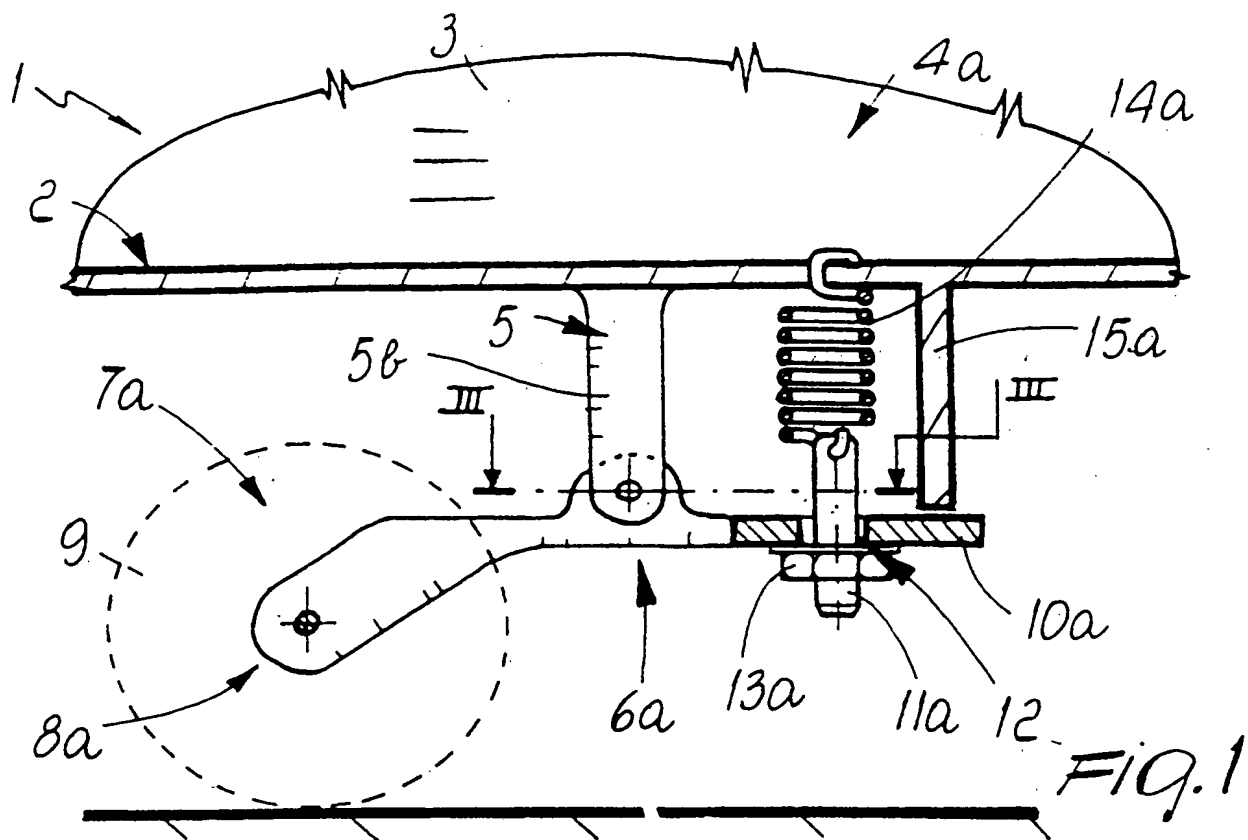
1 14. Skate according to claim 13, characterized in that  
2 said first and second ridges are made of elastically  
3 deformable material and are adapted to limit the maximum  
4 upward movement of said wheels.

1 15. Skate according to claim 1, characterized in that a

2 frame protrudes from said support (302), proximate to the  
3 median region, and is constituted by a pair of wings  
4 (305a,305b) to which two substantially U-shaped trucks  
5 (307a,307b) are independently pivoted approximately at the  
6 median regions, each of said trucks being shaped, starting  
7 from said median regions, so as to extend toward the  
8 adjacent truck, so as to define two pairs of arms  
9 (325a,325b,326a,326b) which mutually cross and overlap and  
10 are individually connected so as to define a first end  
11 (306a,306b) which is arranged respectively at the regions of  
12 said support which are located below the heel (327) and the  
13 tip (328) of the item of footwear (303), said bases being  
14 defined at said first end of each one of said pairs of arms.

1 16. Skate according to claim 1, characterized in that a  
2 frame (405) protrudes below said support (402) and the first  
3 end (406) of a substantially U-shaped truck (407) is pivoted  
4 to said frame, a wheel (409) being pivoted between the  
5 second ends (408) of said truck, a base (410) protruding  
6 from said first end of said truck in the direction opposite  
7 to said wheel, a first threaded hole (412) being defined on  
8 said base.

1 17. Skate according to claim 16, characterized in that  
2 the end of an elastically deformable element (414) is  
3 associated with said base at its other end, and is  
4 associated below said support at said underlying base; a  
5 complementarily threaded stem (411) of a screw being  
6 associated at said first hole, the head (417) of said screw  
7 protruding beyond said base toward the ground, the end of  
8 said screw resting on an abutment (429) which protrudes  
9 below said support.



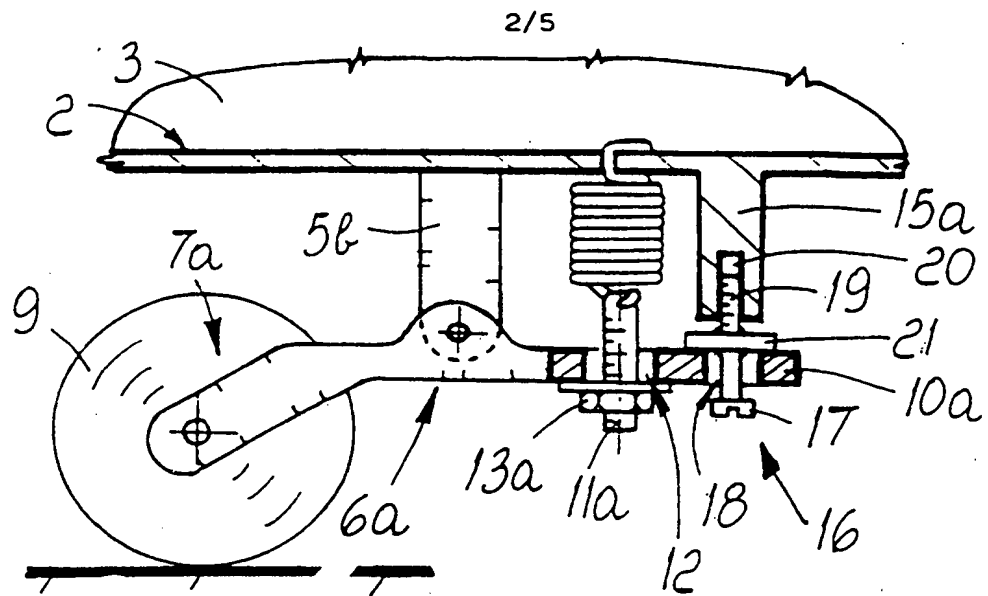


Fig. 4

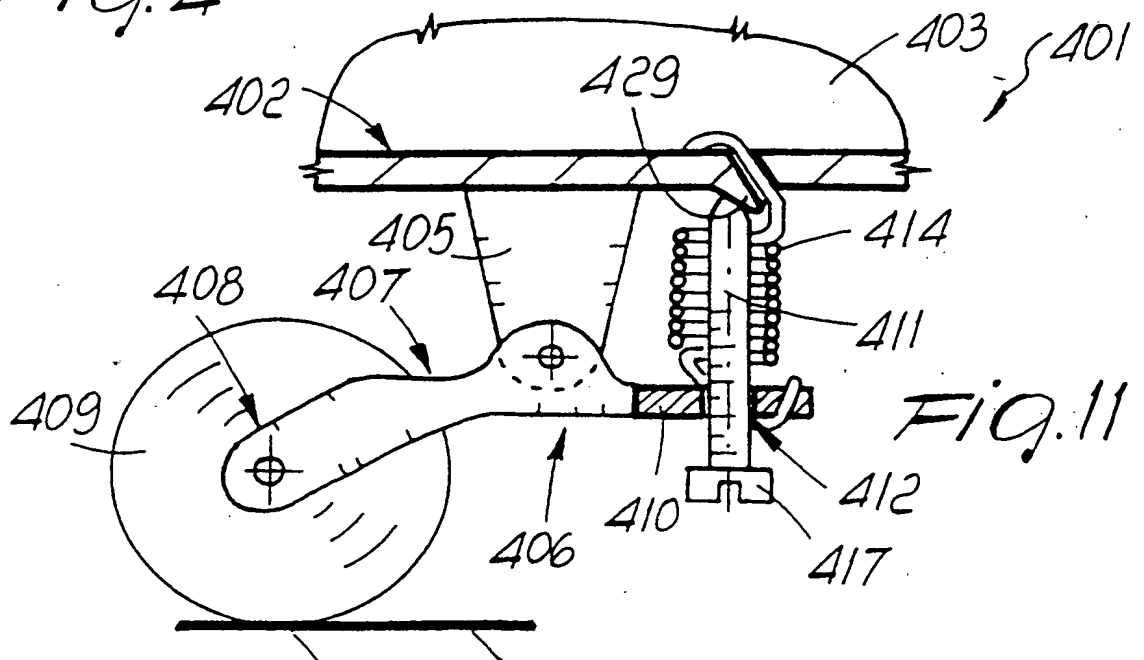


Fig. 11

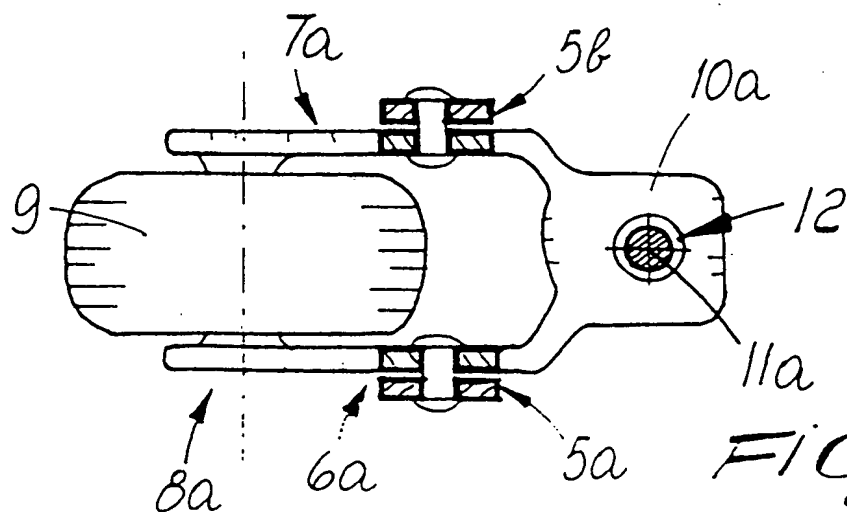
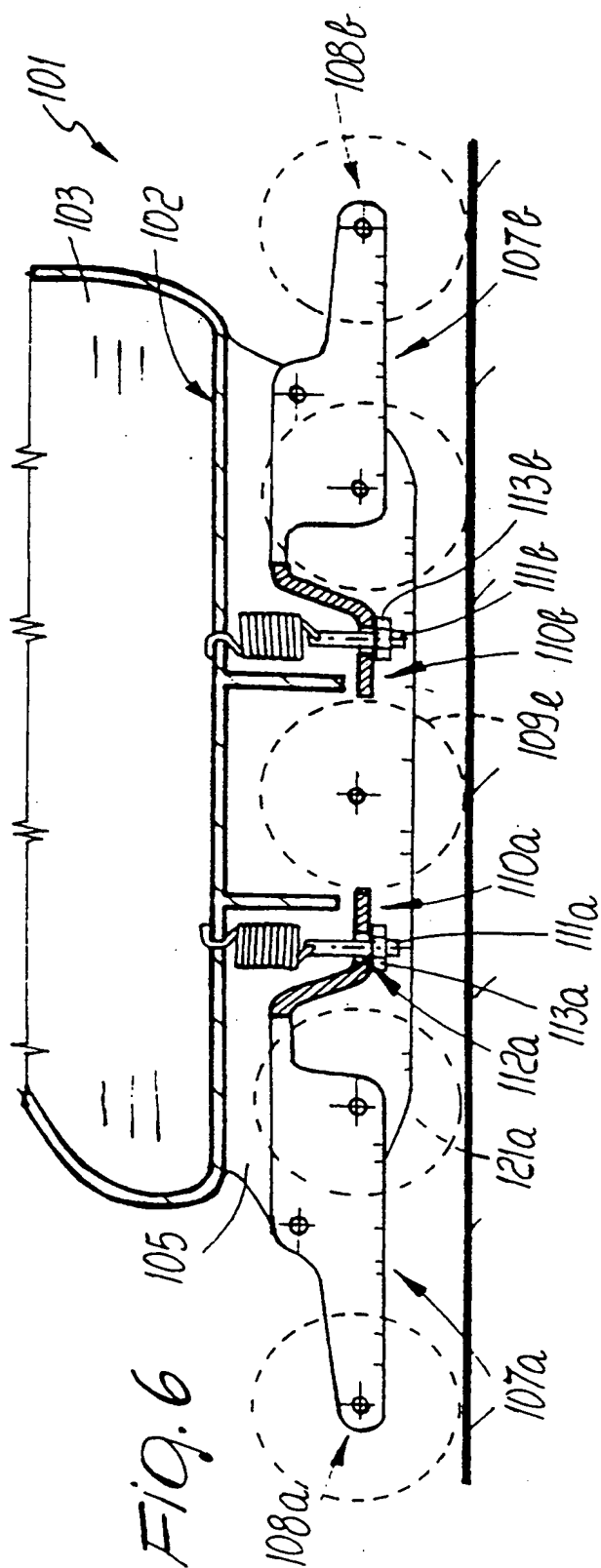
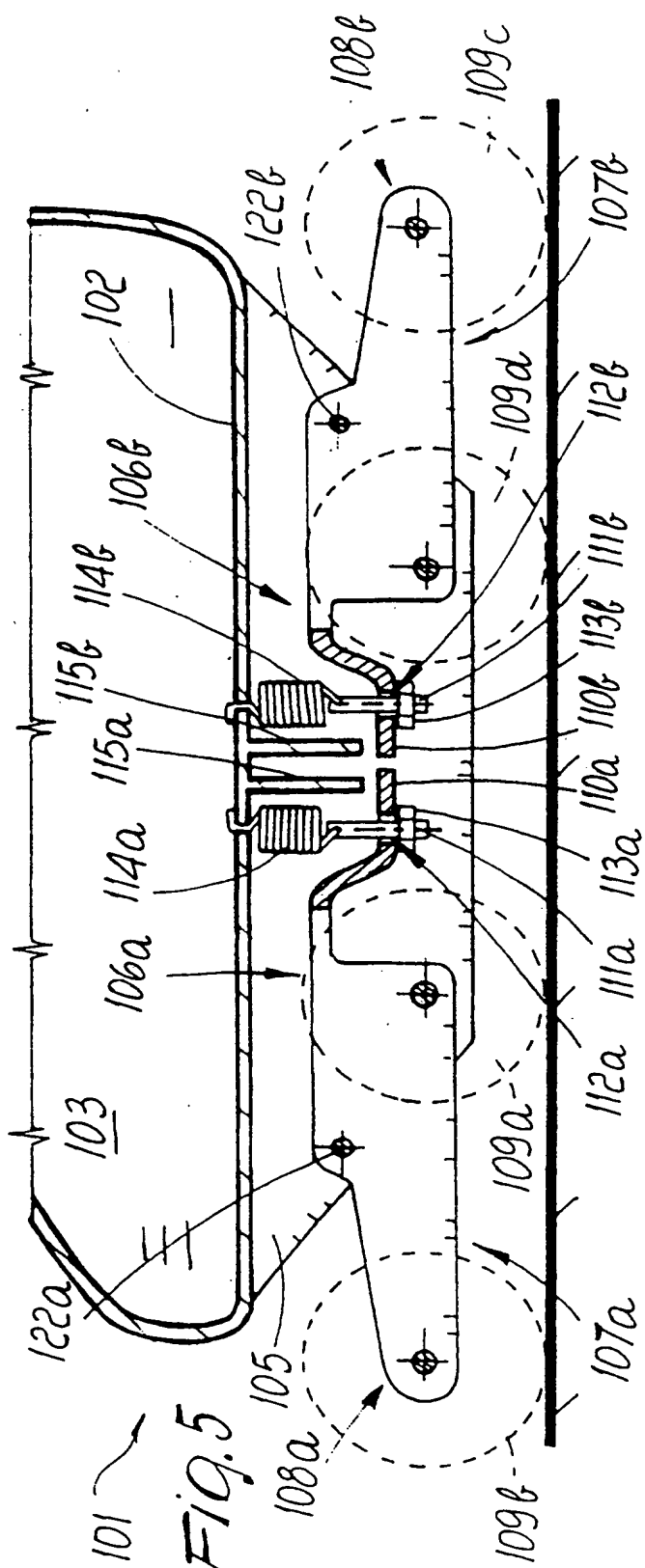


Fig. 3



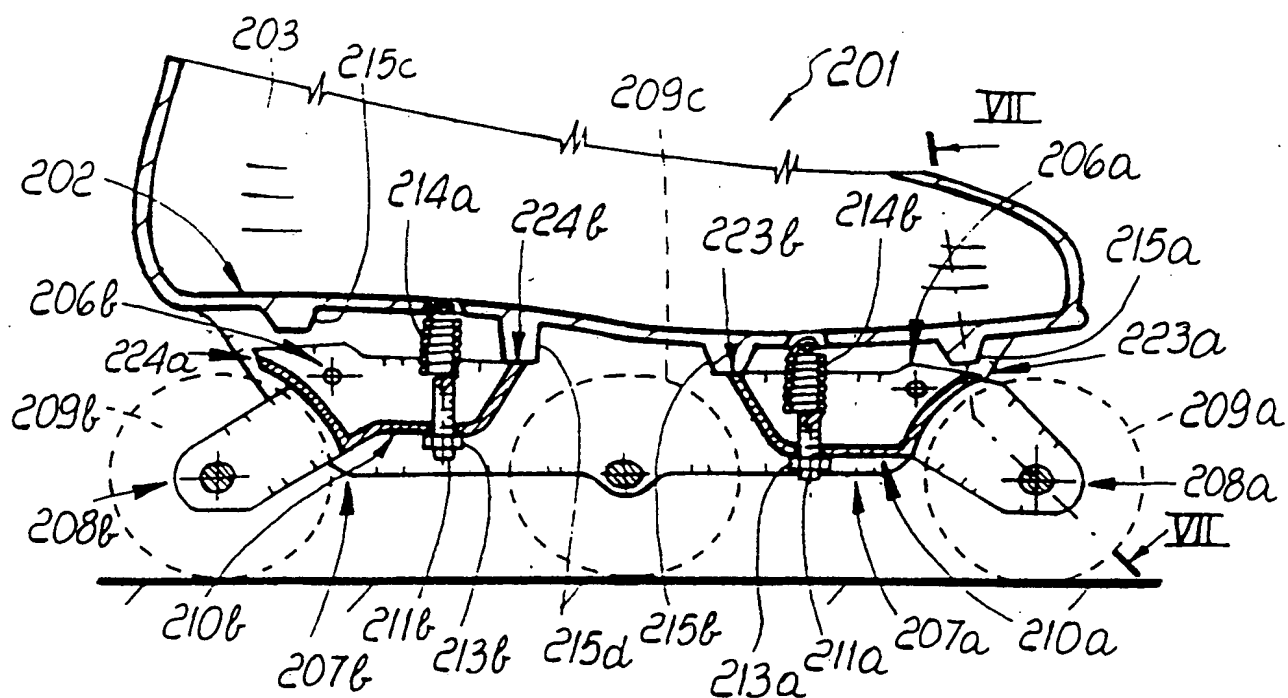


Fig. 7

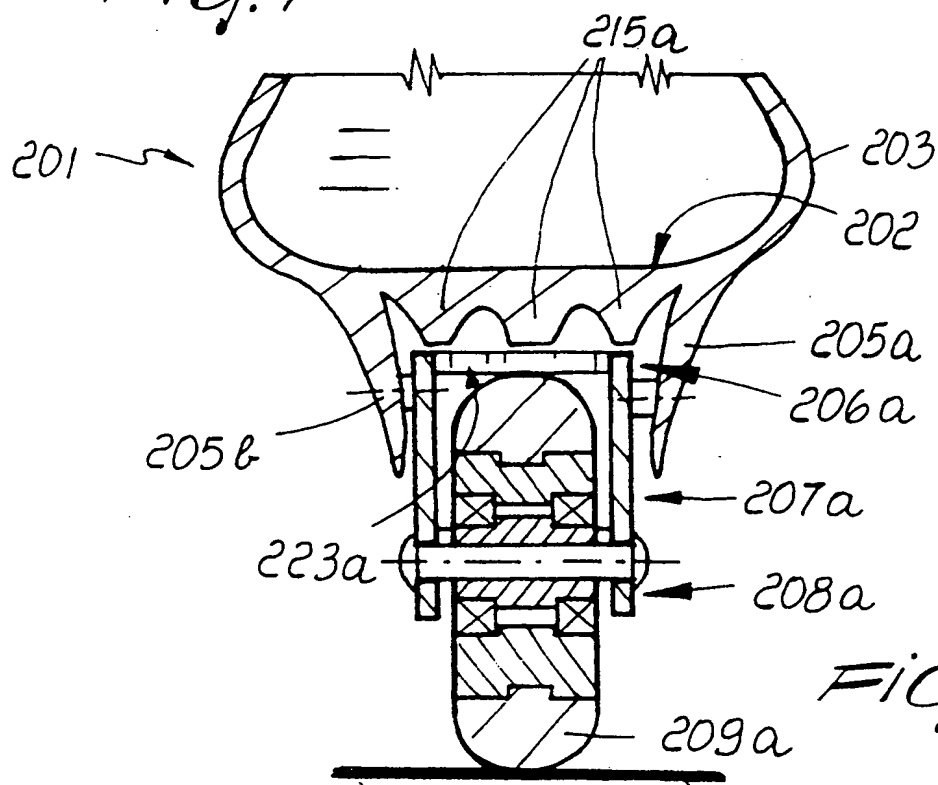
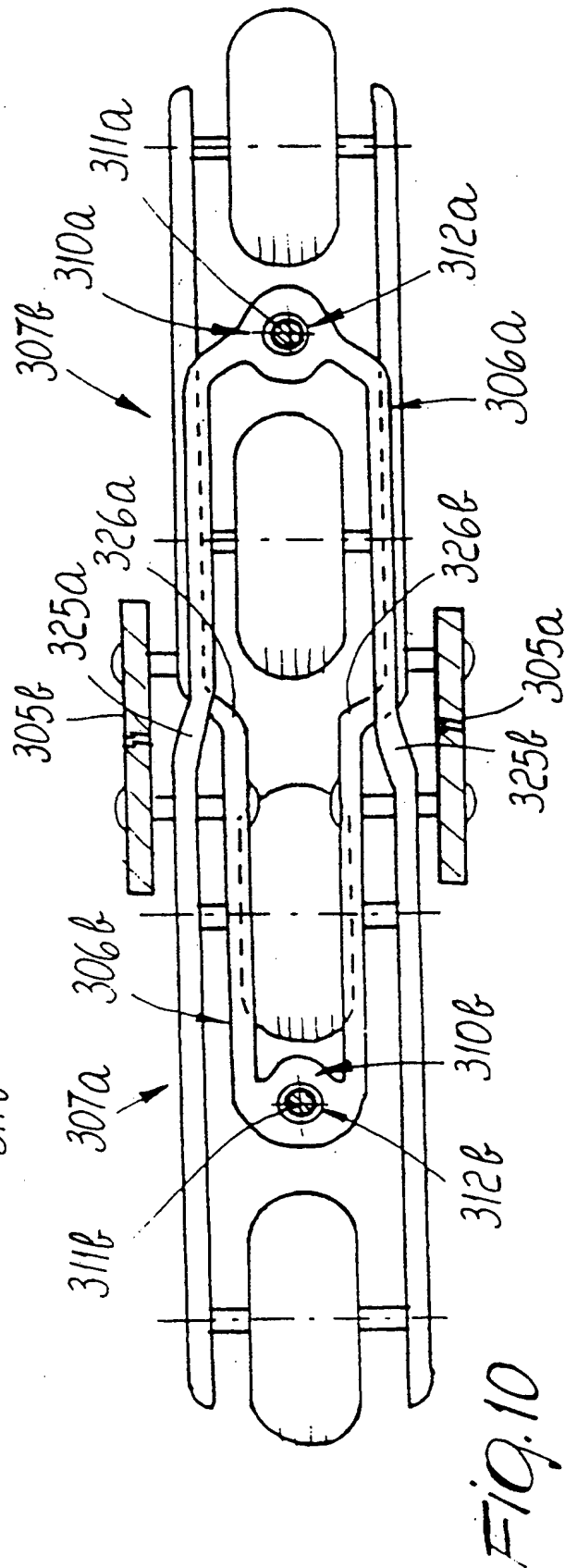
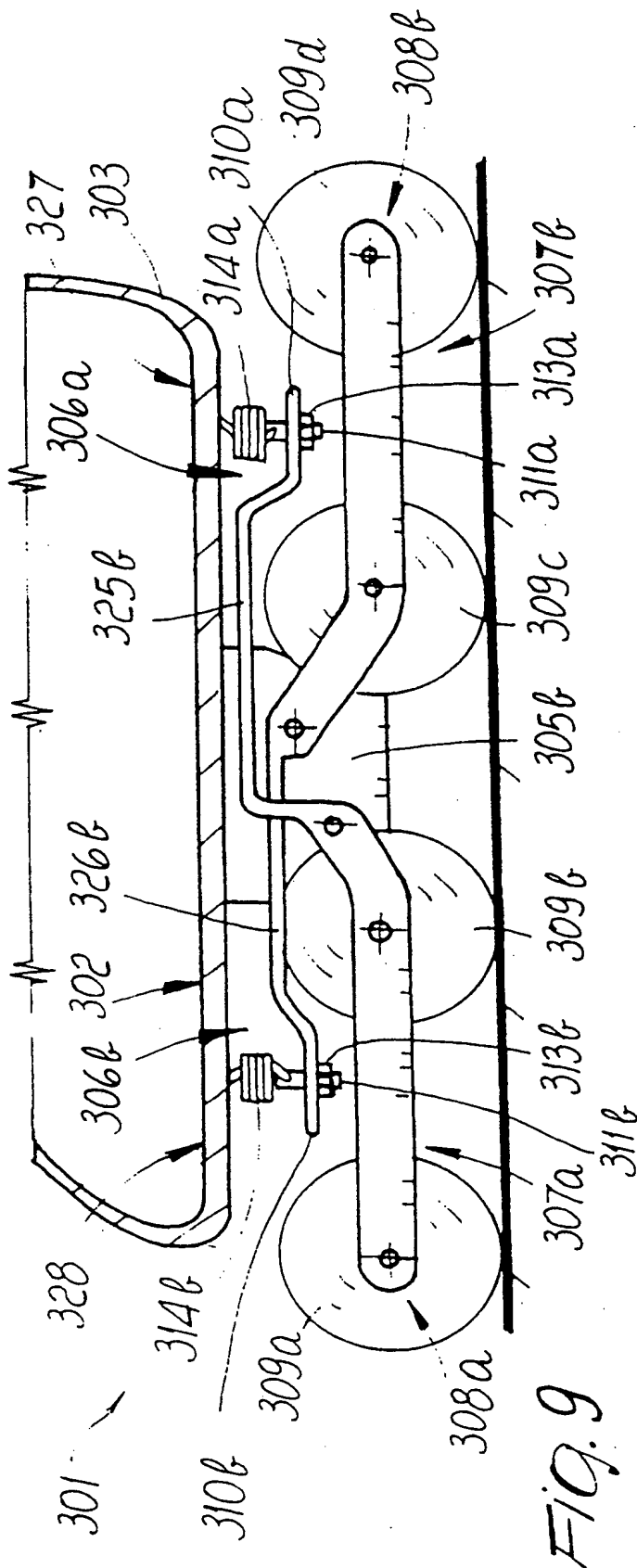


Fig. 8





## A. CLASSIFICATION OF SUBJECT MATTER

IPC5: A63C 17/06

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC5: A63C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	DE, C, 654100 (H. FISCHER), 10 December 1937 (10.12.37) --	1,2,3,5
Y	US, A, 1002729 (W. & J.H. MILLS), 5 Sept 1911 (05.09.11), page 1, column 2, line 91 - line 104 --	1,2,3,5
Y	FR, A1, 2660205 (PICARD, B.M.), 4 October 1991 (04.10.91), page 4, line 30 - line 31, figure 9 --	1
A	DE, C, 167622 (WLADYSLAWA DANKOWSKA), 7 February 1906 (07.02.06), figure 1 --	7



Further documents are listed in the continuation of Box C.



See patent family annex.

## \* Special categories of cited documents:

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier document but published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&amp;" document member of the same patent family


Date of the actual completion of the international search

30 March 1993

Date of mailing of the international search report

16.04.93

Name and mailing address of the ISA/



European Patent Office, P.B. 3818 Patentaan 2  
NL-2280 HV Rijswijk  
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl.  
Fax: (+31-70) 340-3016

Authorized officer

Ake T Larson

2  
INTERNATIONAL SEARCH REPORT

International application No.

PCT/EP 92/02892

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A,P	WO, A1, 9210251 (NORDICA S.P.A.), 25 June 1992 (25.06.92), figures 1-8  -- -----	7,11

**INTERNATIONAL SEARCH REPORT**  
Information on patent family members

A 424

26/02/93

International application No.  
PCT/EP 92/02892

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE-C- 654100	10/12/37	NONE	
US-A- 1002729	05/09/11	NONE	
FR-A1- 2660205	04/10/91	NONE	
DE-C- 167622	07/02/06	NONE	
WO-A1- 9210251	25/06/92	AU-A- 9038691 EP-A- 0513301	08/07/92 19/11/92